Figure 1A

PRIOR ART

Figure 1B

PRIOR ART

Figure 2A

# Figure 2B

Figure 3
PRIOR ART

$$\Rightarrow R_1 = \frac{K}{N-1}$$

$$\Rightarrow R_2 = \frac{K}{N-2}$$

$$\Rightarrow R_3 = \frac{K}{N-3}$$

$$\Rightarrow R_{N-K} = 1$$

S_1

S_2

S_3

S_{N-K}
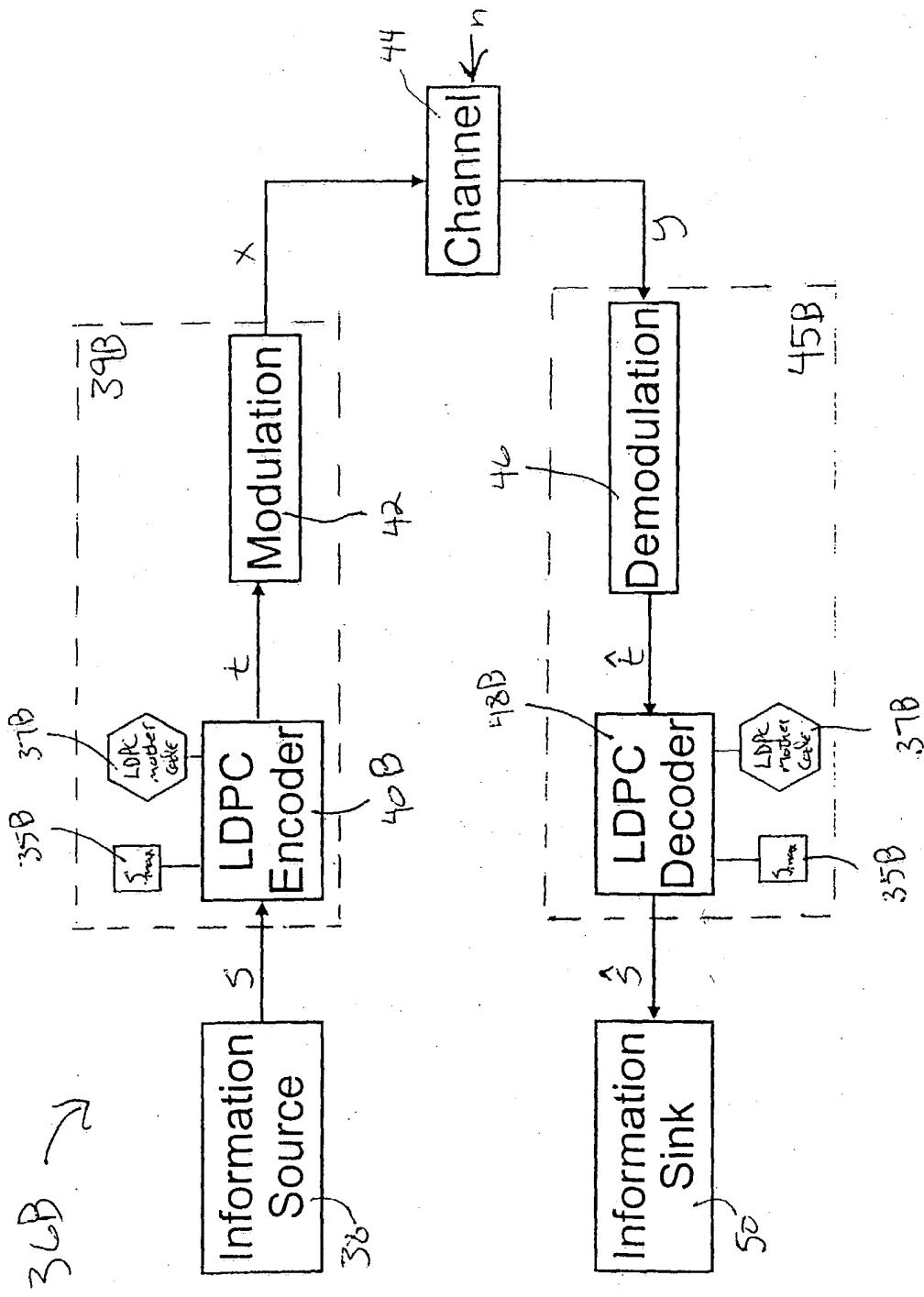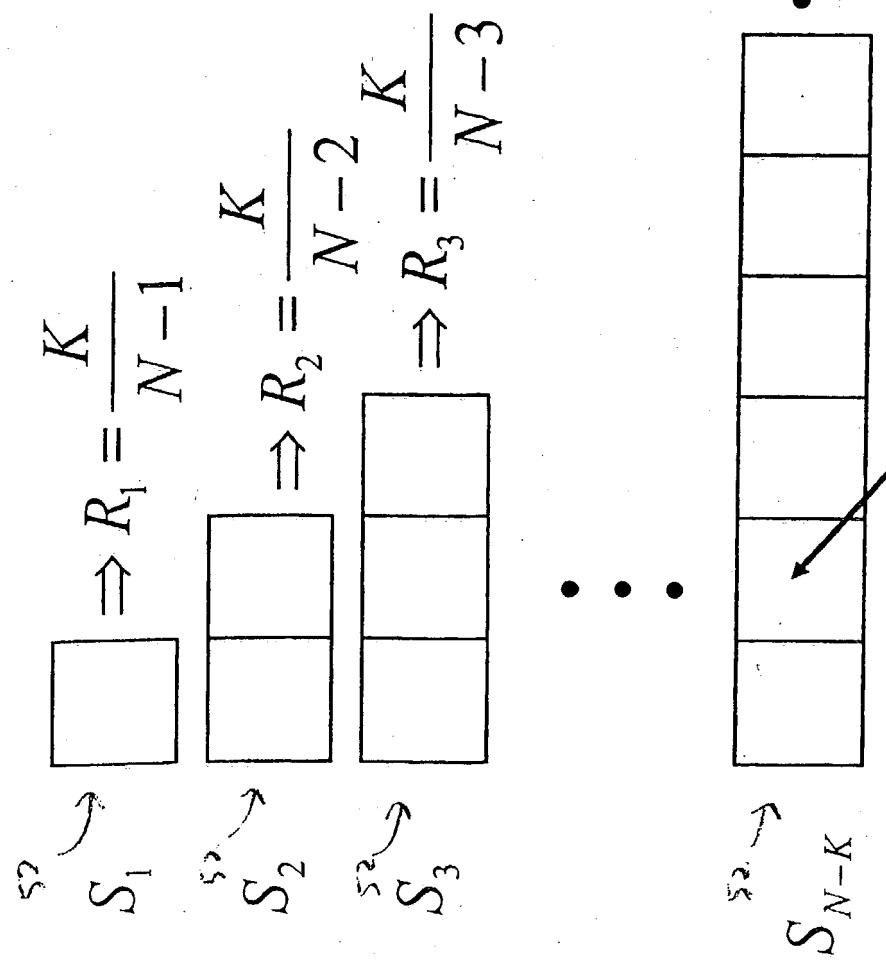
Memory Elements
Contain Degree
or Node Sequence

Figure 4

$$S_1 \subseteq S_2 \subseteq \cdots \subseteq S_{N-K-1} \subseteq S_{N-K}$$

Memory Elements 54
Contain Degree
or Node Sequence

54a	54b	54c	54d						
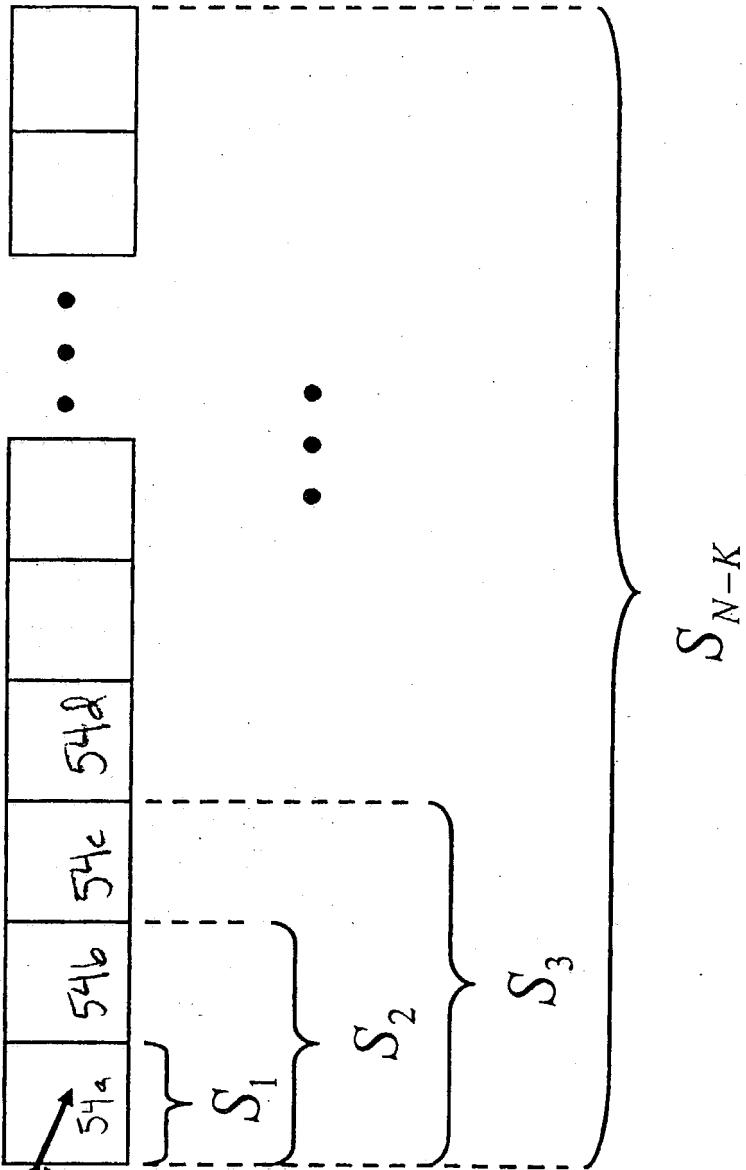
S_1

S_2

S_3

S_{N-K}

Figure 5

$$S_1 \subseteq S_{N-K}$$

$$S_2 \subseteq S_{N-K}$$

$$\vdots$$

$$S_{N-K-1} \subseteq S_{N-K}$$

Memory Elements 54
Contain Degree
or Node Sequence

Figure 6

Prior Art

Present Invention

All Possible Sequences

All Sequences
Present Invention
Prior Art

Codeword Length

Memory Elements

10^0 10^1 10^2 10^3 10^4

10^0 10^1 10^2 10^3 10^4 10^5 10^6 10^7 10^8
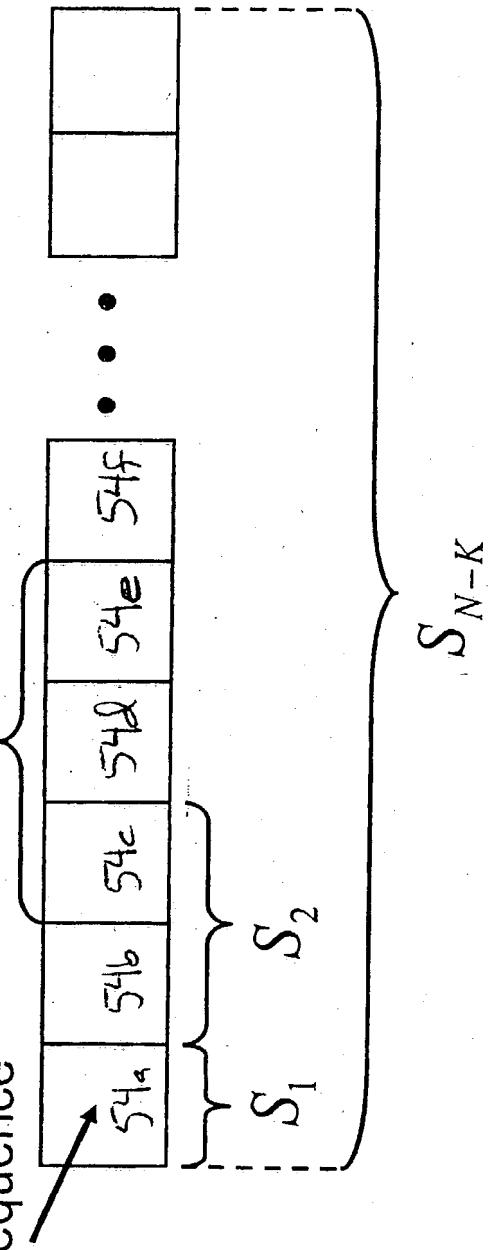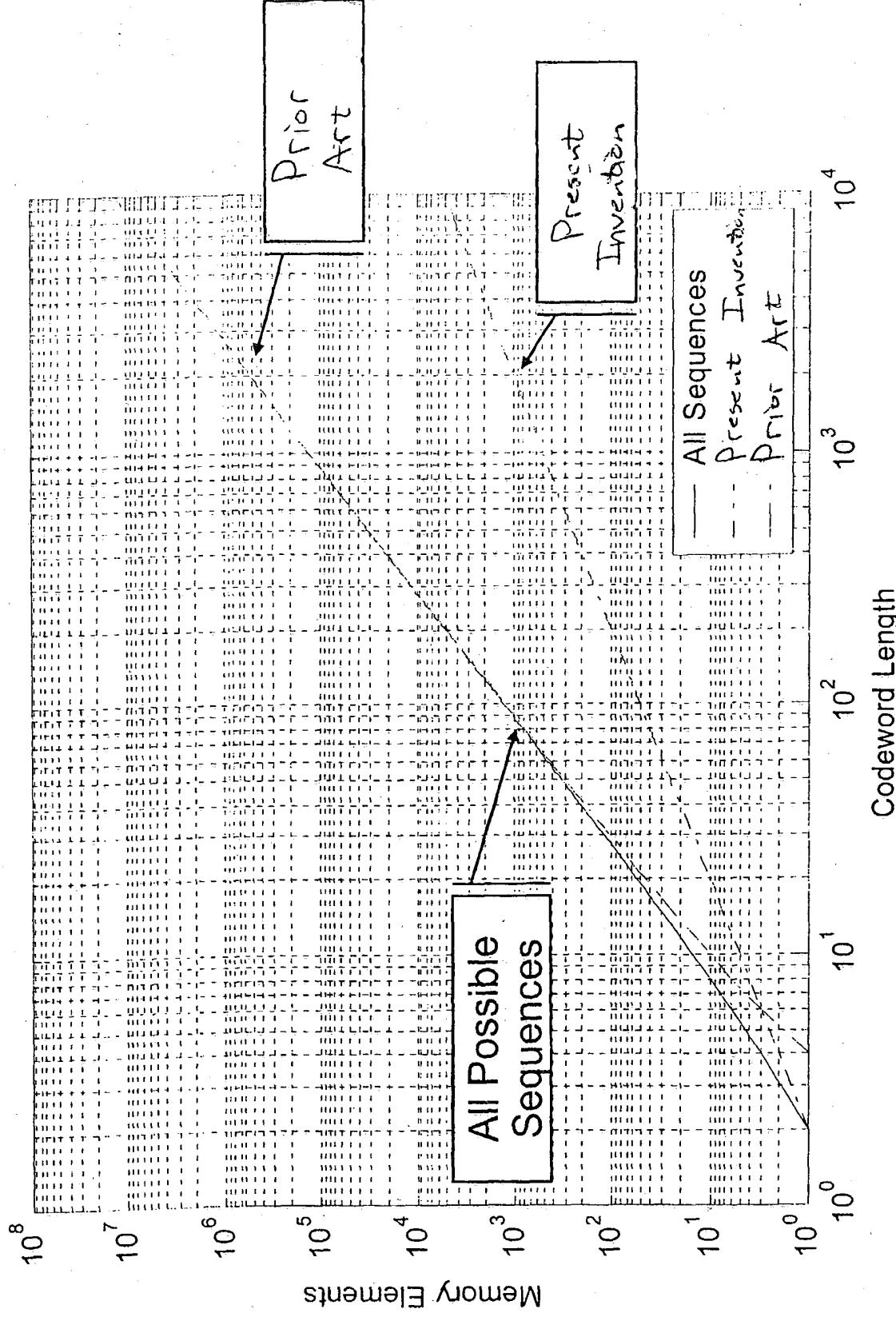
Figure 7

LDPC Punctured N1082 M541Code12.mat

Legend:
- variable degree 2
- variable degree 3
- variable degree 4
- variable degree 10

Y-axis: $\pi_f(0)$

X-axis: Effective Coderate
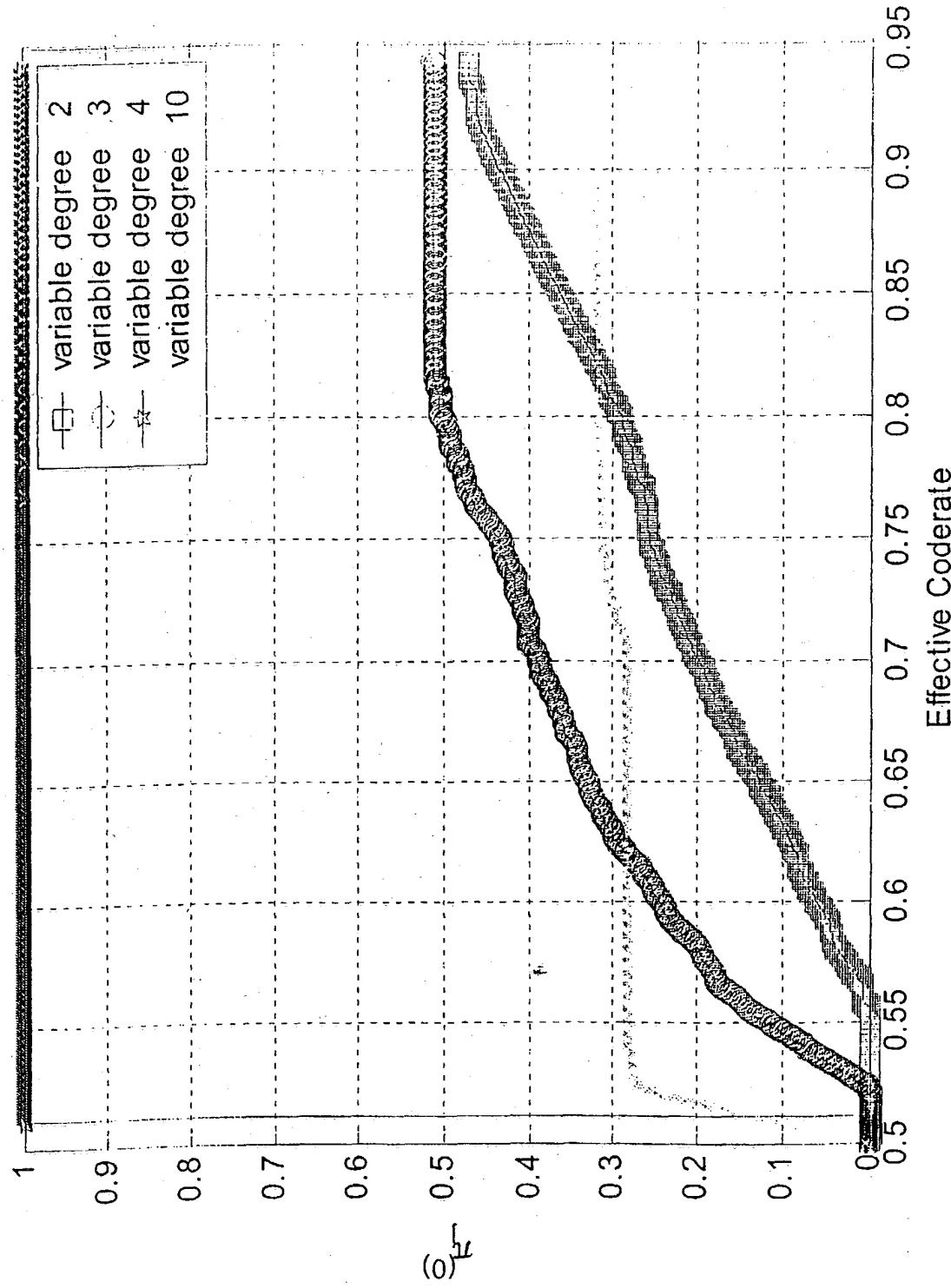
Figure 8

LDPC Punctured N3255 M1627Code11.mat

Legend:
- variable degree 2
- variable degree 3
- variable degree 4
- variable degree 10

Y-axis: $\pi_v(0)$

X-axis: Effective Coderate
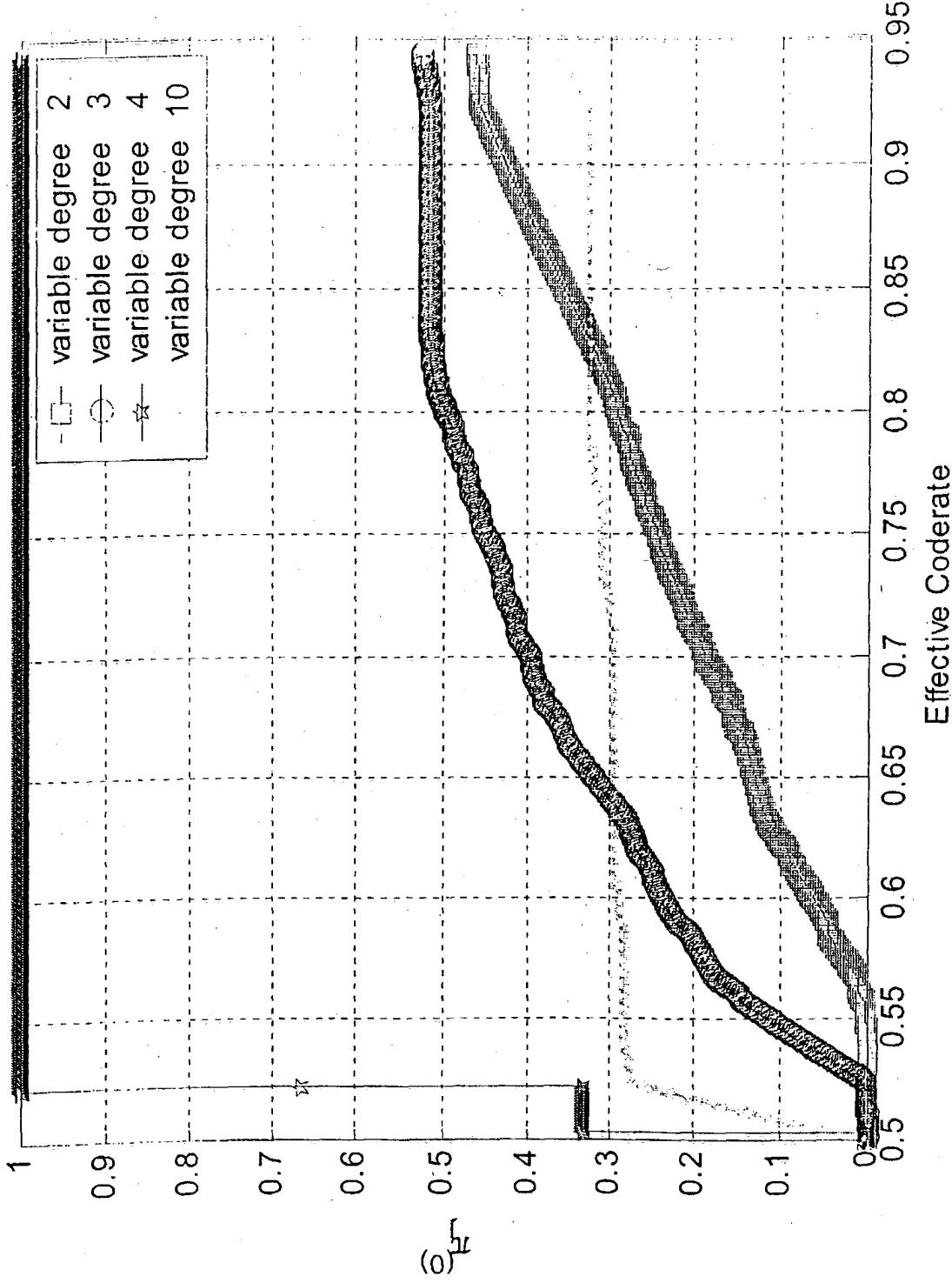
Figure 9

sim output N1082 M541Code12 100iters.mat

Legend:
- Rate 0.500
- Rate 0.526
- Rate 0.555
- Rate 0.588
- Rate 0.625
- Rate 0.667
- Rate 0.715
- Rate 0.770
- Rate 0.834
- Rate 0.911

X-axis: Eb/No dB (0 to 12)

Y-axis: BER (10^0 to 10^{-7})
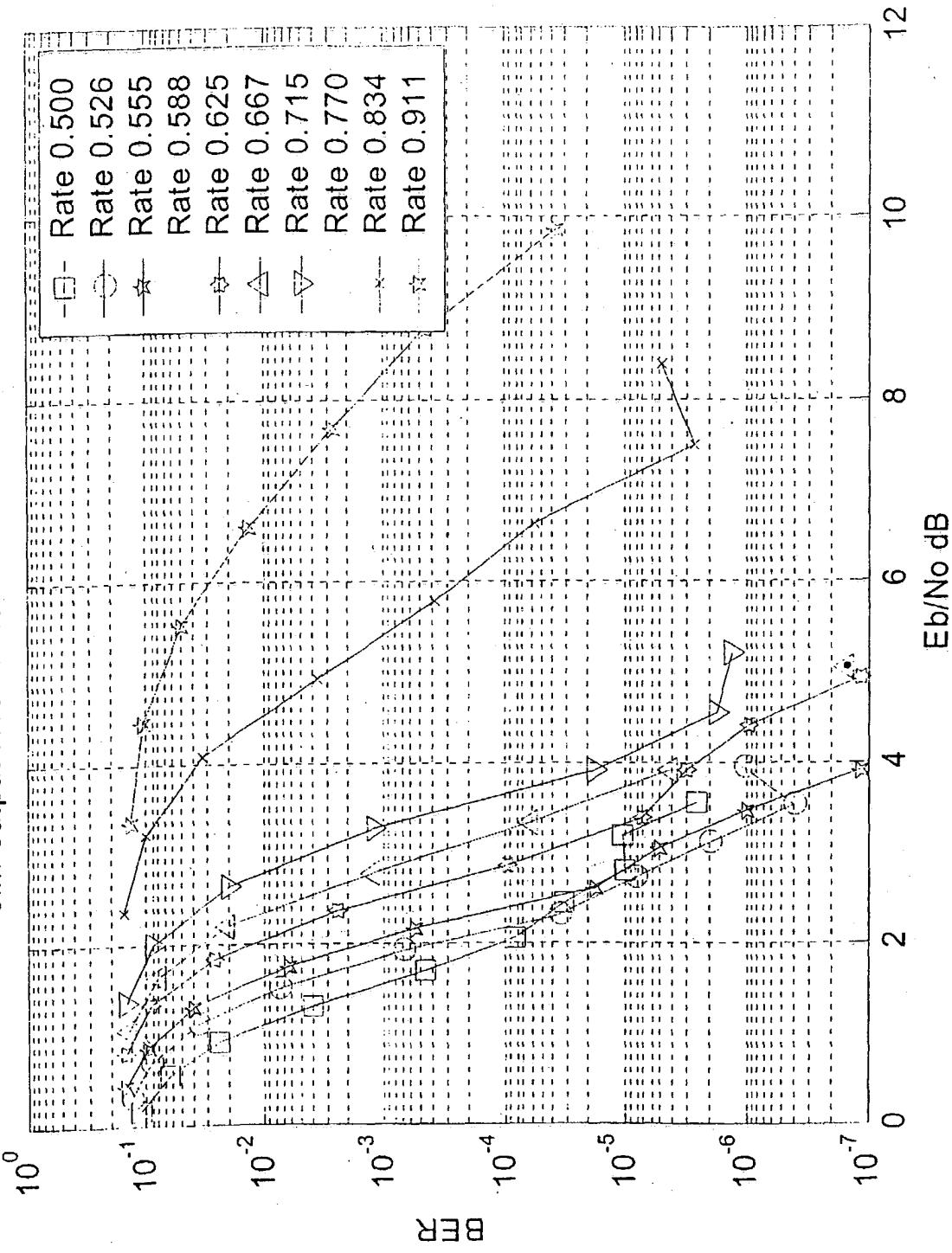
Figure 10

sim output N1082 M541Code12 100iters.mat

Legend:
- Rate 0.500
- Rate 0.526
- Rate 0.555
- Rate 0.588
- Rate 0.625
- Rate 0.667
- Rate 0.715
- Rate 0.770
- Rate 0.834
- Rate 0.911

Y-axis: CER (10^0, 10^{-1}, 10^{-2}, 10^{-3}, 10^{-4}, 10^{-5})

X-axis: Eb/No dB (0, 2, 4, 6, 8, 10, 12)
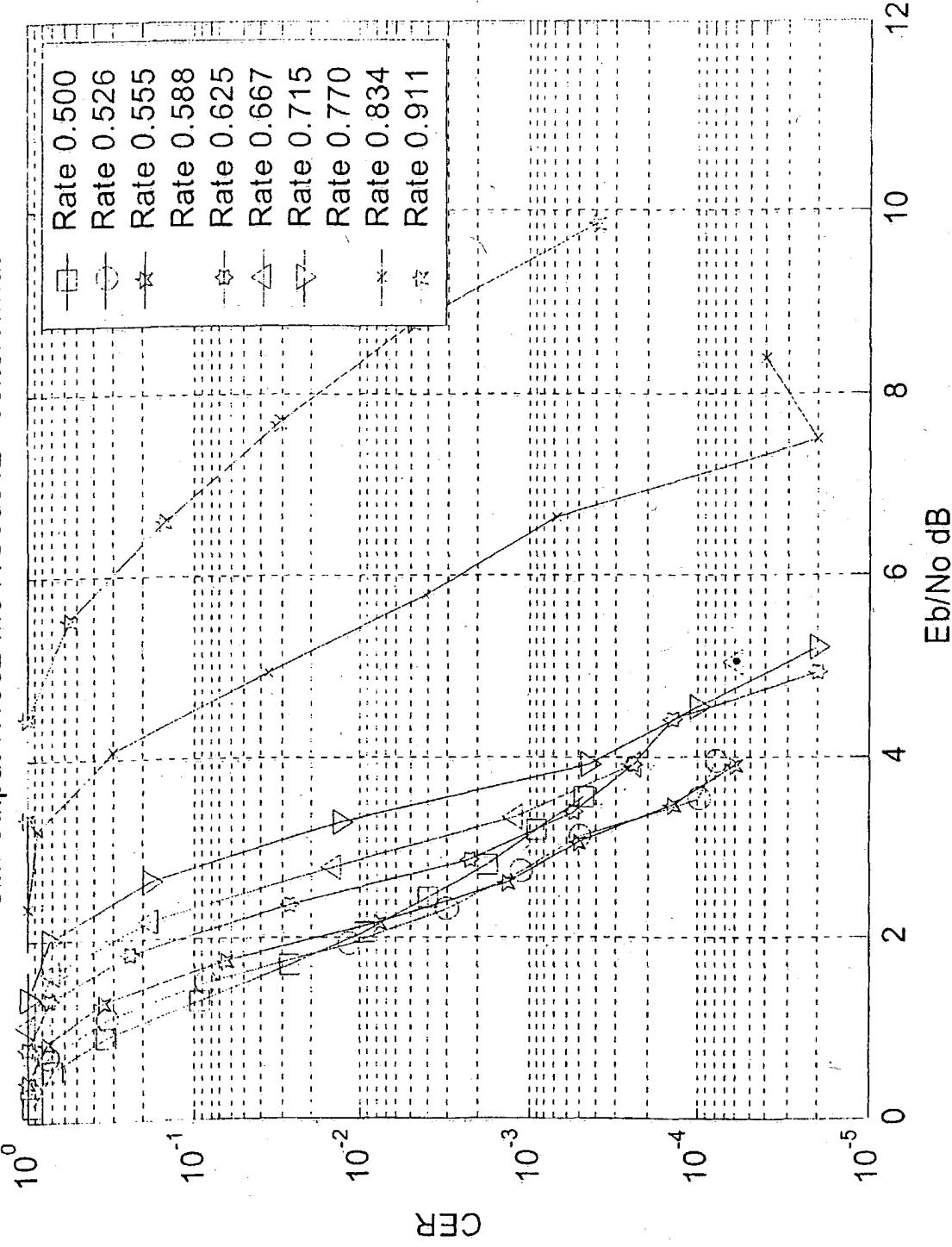
Figure 11

sim output N1082 M541Code12 100iters.mat

Gap from Shannon Capacity (BER=0.001) [Eb/No dB] vs Effective Coderate

Legend:
- * Simulation (N=1082, BER=0.001)
- □ 100 Iterations (BER=0.001) Threshold (GA)
- — Asymptotic Threshold (GA)
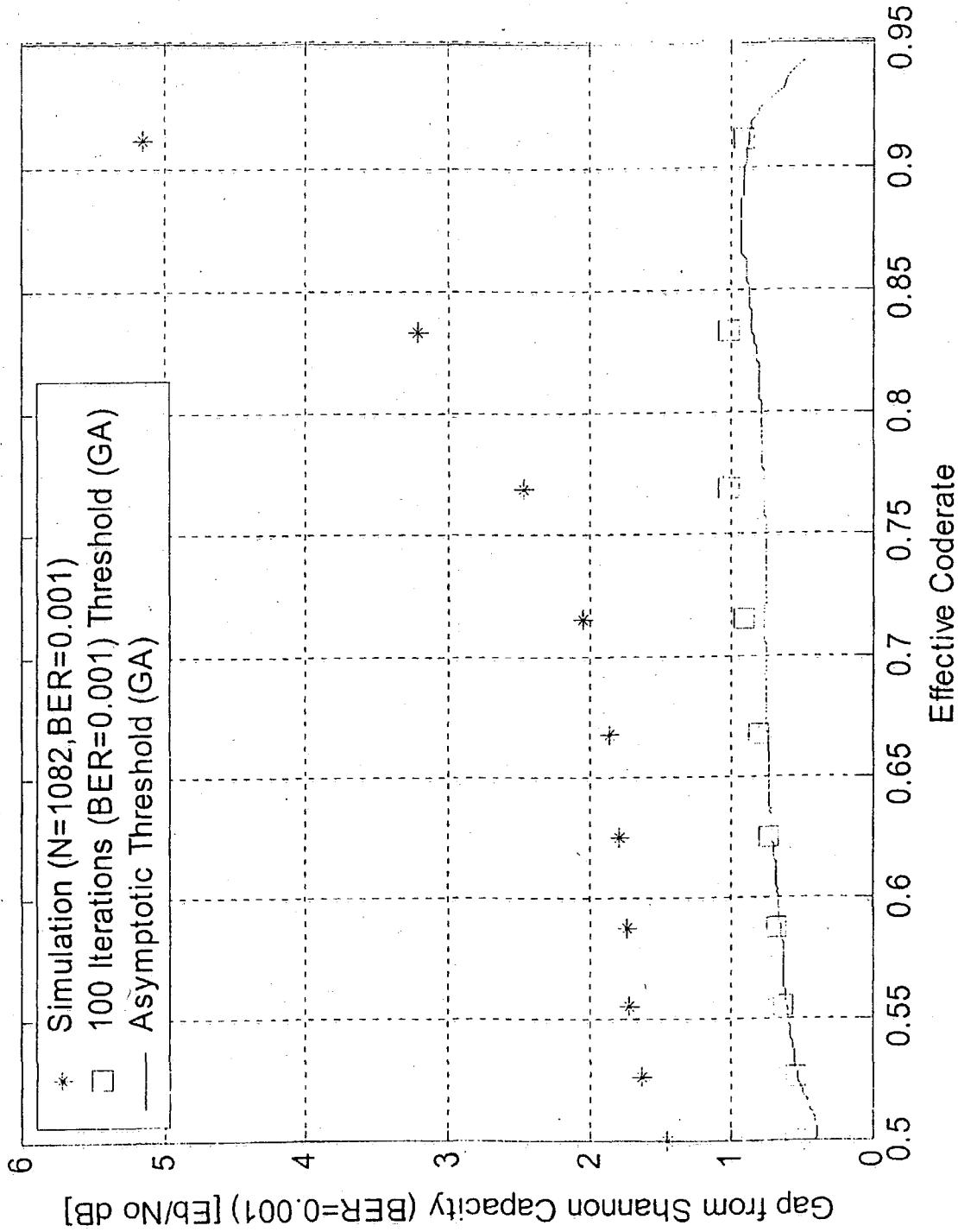
Figure 12

sim output N1082 M541Code12 100iters.mat

Legend:
- * Simulation (N=1082,BER=0.001)
- □ 100 Iterations (BER=0.001) Threshold (GA)
- Asymptotic Threshold (GA)
- Binary Signaling Shannon Capacity (BER=0.001)

Eb/No dB

Effective Coderate
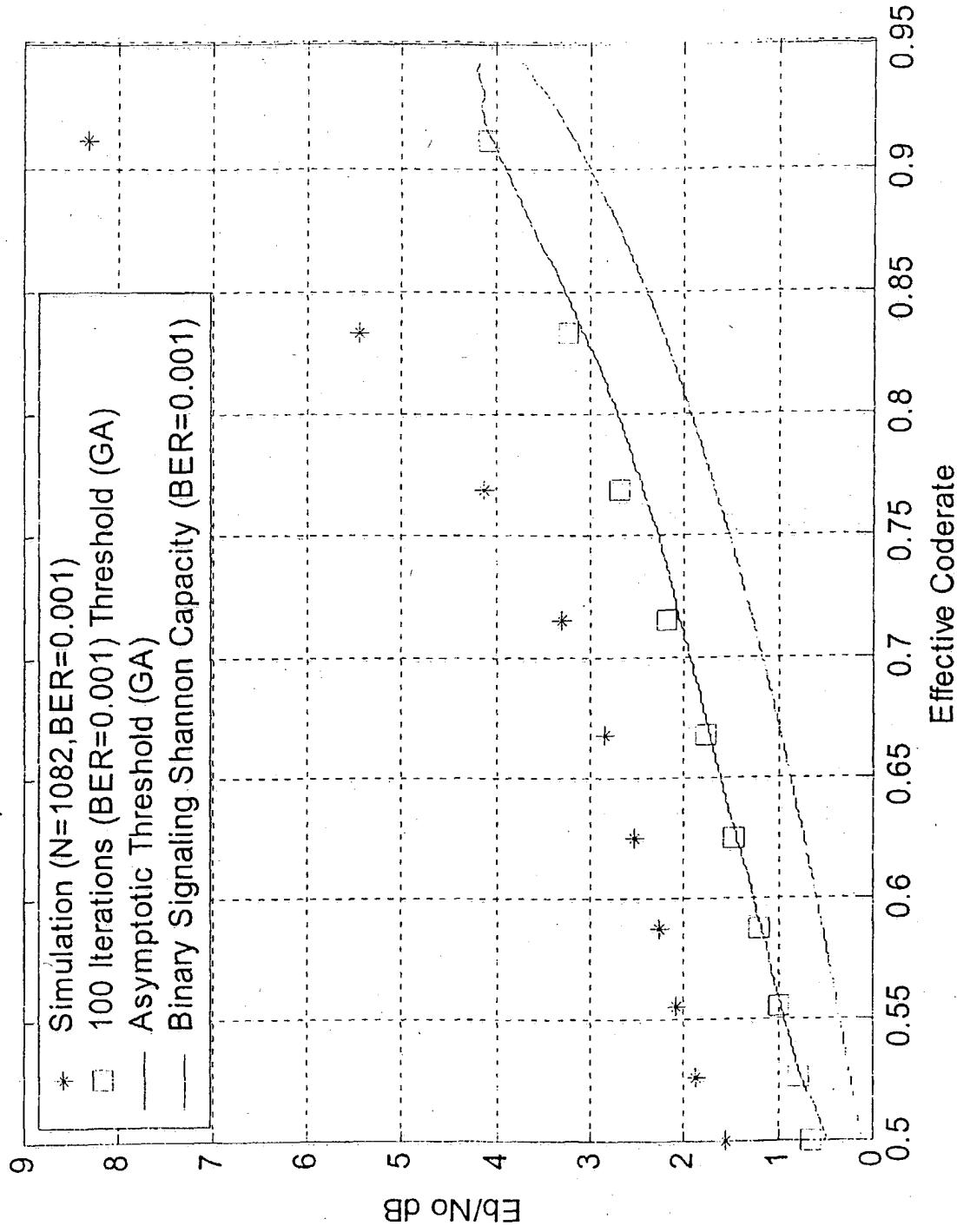
Figure 13

sim output N3255 M1627Code11 100iters.mat

Legend:
- Rate 0.500
- Rate 0.527
- Rate 0.558
- Rate 0.592
- Rate 0.630
- Rate 0.674
- Rate 0.724
- Rate 0.782
- Rate 0.851
- Rate 0.933

X-axis: Eb/No dB

Y-axis: BER
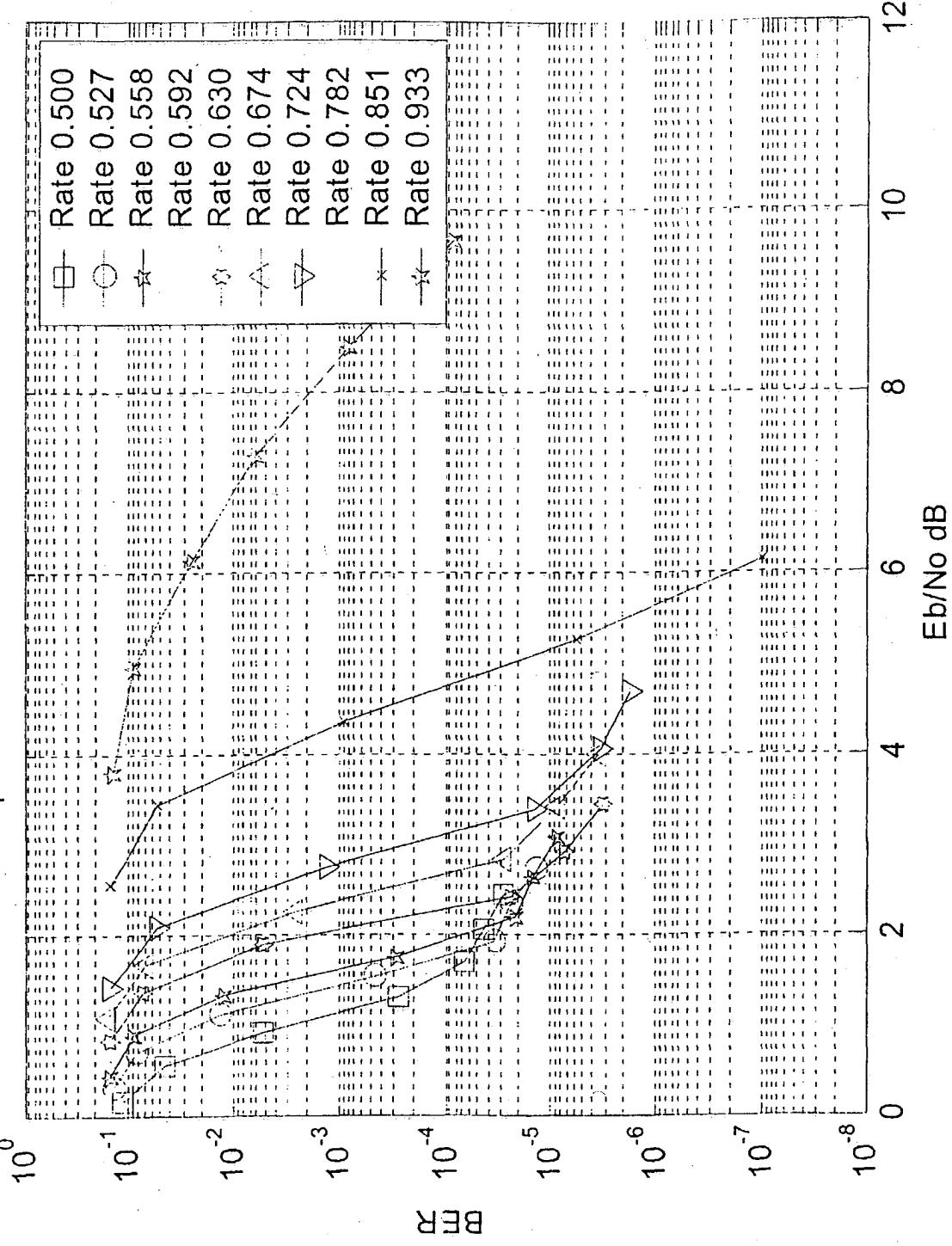
Figure 14

sim output N3255 M1627Code11 100iters.mat

Legend:
- Rate 0.500
- Rate 0.527
- Rate 0.558
- Rate 0.592
- Rate 0.630
- Rate 0.674
- Rate 0.724
- Rate 0.782
- Rate 0.851
- Rate 0.933

CER vs Eb/No dB
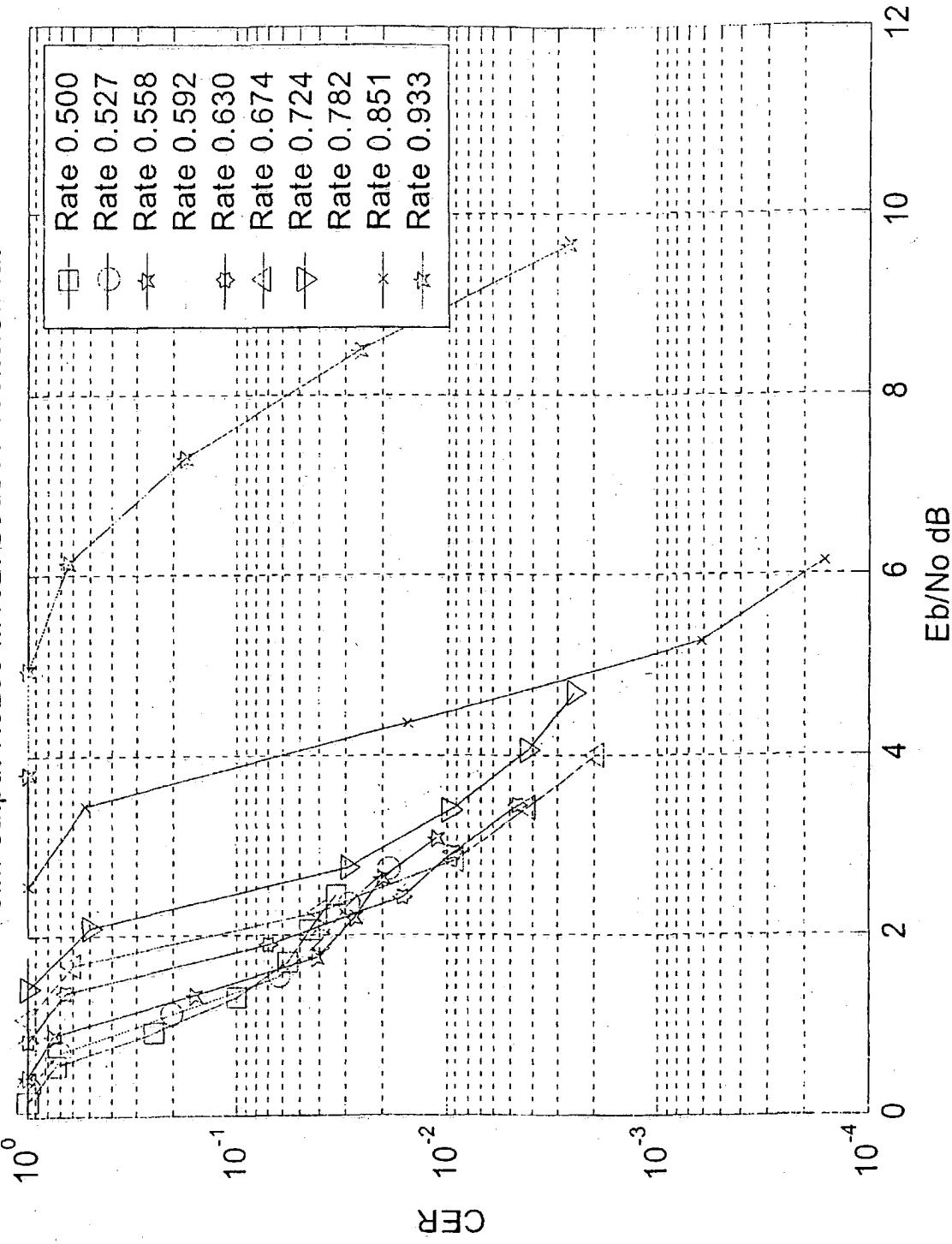
Figure 15

sim output N3255 M1627Code11 100iters.mat

Legend:
- * Simulation (N=3255, BER=0.001)
- □ 100 Iterations (BER=0.001) Threshold (GA)
- —— Asymptotic Threshold (GA)

X-axis: Effective Coderate (0.5 to 0.95)

Y-axis: Gap from Shannon Capacity (BER=0.001) [Eb/No dB] (0 to 5)
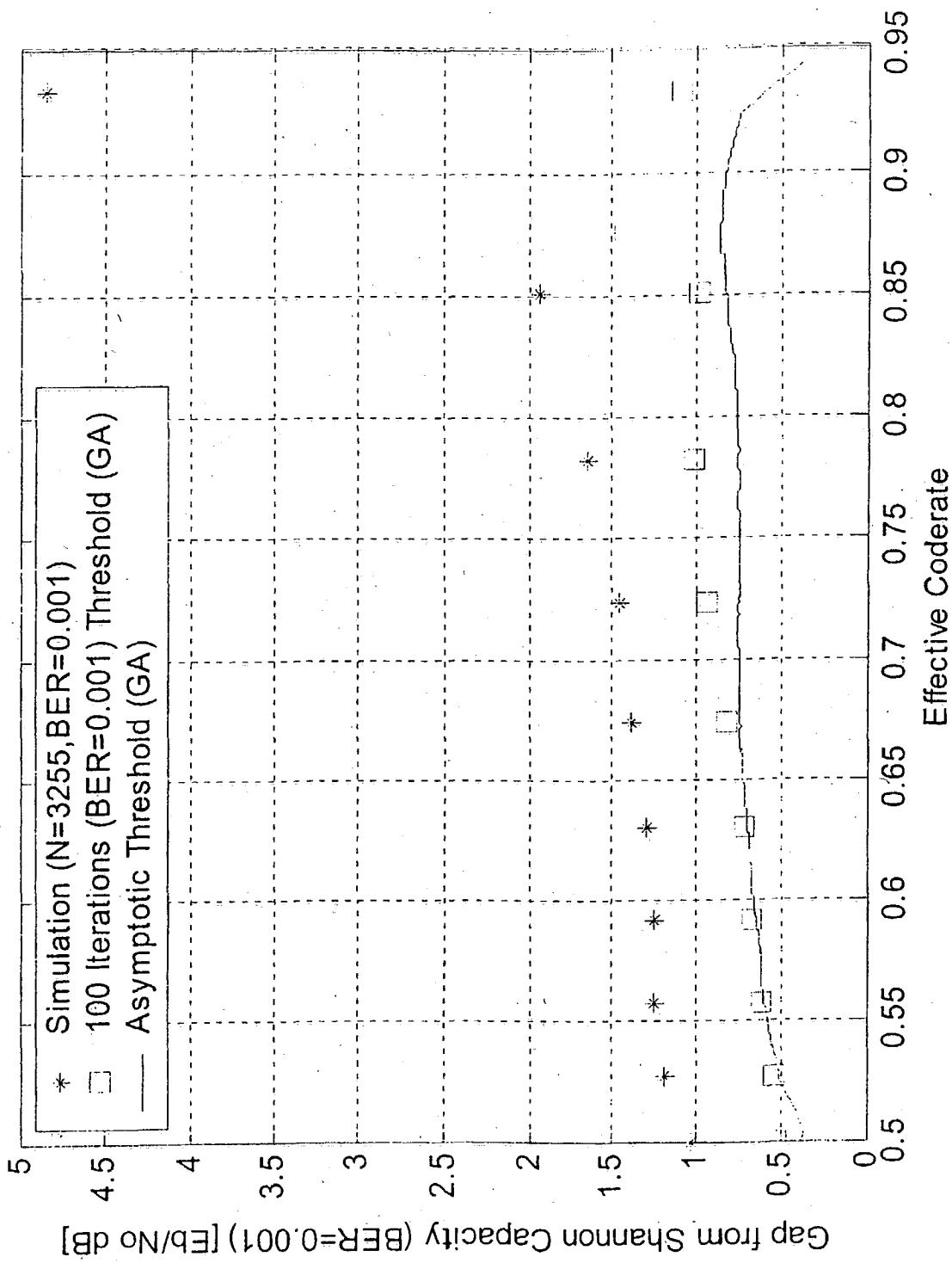
# Figure 16

sim output N3255 M1627Code11 100iters.mat

Legend:
- ＊ Simulation (N=3255, BER=0.001)
- □ 100 Iterations (BER=0.001) Threshold (GA)
- —— Asymptotic Threshold (GA)
- — — Binary Signaling Shannon Capacity (BER=0.001)

X-axis: Effective Coderate (0.5 to 0.95)

Y-axis: Eb/No dB (0 to 9)